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THE PROGRESS OF SCIENCE

*THE CRITICAL SITUATION OF
EDUCATION AND SCIENCE*

THE present year is a critical point in the development of science. The present fluid state of research may congeal into static frigidity or it may develop energy to transform the world. The events of the last years—to draw on biological as well as physical science for a metaphor—may have resulted in leaving as their offspring infertile hybrids or in a cross-fertilization leading to unexampled productivity. To complete the circle of the sciences, it may be urged that the result depends primarily not on the existing environment or in the inherited organisms, but on the reactions of the latter to the former, and thus on conditions which are to a certain extent under our own control.

The continental nations of Europe must for a generation devote their energies largely to the repair of destruction, and this holds to a certain extent for England. We have suffered serious losses of men and of wealth, but have only drawn upon an available surplus. We are thus free, as most other nations are not, to control our future. Some two billion dollars a year, for example, will accrue from enforced savings through the suppression of the sale of alcohol. This money can be consumed on luxuries for the rich, it can add three per cent. to the comforts of the great mass of the people or it can be used for investments, the most productive of which are education and scientific research.

There has probably never been a period or a nation in which education and science were more highly regarded than at the present time in the United States. It is generally

understood that the aggression of Germany in the war was so formidable on account of the development of its industrial civilization based on the applications of science and the thorough training of the people. Russia was helpless before such an enemy; England and France could reply with somewhat similar weapons, but it required the United States to turn the balance. Equally in time of peace, national prosperity depends on science and education. An autocracy, such as formerly existed in Germany, may realize this fact more promptly and apply its knowledge more effectively in practice than a democracy which leaves higher education and scientific research to private initiative or unorganized public support. It is our business to see that the conditions become equally favorable in our social and political system.

At a time when it is important for us to assume leadership in education and research and the people of the country realize the fact, it is most unfortunate that what may be regarded as an economic accident, has intervened to cause serious difficulty. The depreciation in the purchasing power of money is working serious injustice to many individuals, but in no other case has it done such harm to society as in reducing to nearly half the salaries paid to teachers and to scientific men. They may submit to suffer as a part of the cost of war, but the injury to the nation must be remedied. It is consequently a satisfaction to note that action has recently been taken by the scientific and professional men in the service of the government and by the National Education Association to make known the situ-

ation. We give extracts from the reports of the two groups.

THE CONDITIONS IN THE GOVERNMENT SERVICE

The committee representing the scientific, technical and professional services report that existing conditions in the federal government service disclose the fact that adequate standards of personnel and of performance are not being maintained, that the situation is becoming worse instead of better, that a force which was depleted by the demands of war has become still further depleted since the cessation of hostilities and that this depletion is proceeding at a constantly increasing rate, until it is only a matter of months before it will be humanly impossible for the experienced personnel remaining to perform adequately the duties devolving upon them. While a certain percentage of turnover in an organization is not harmful and may even be desirable, an annual turnover of 25, 50 or even 100 per cent. and more which is occurring at the present time in the federal government service is disruptive of the organizations, reduces the efficiency of the work and largely increases its cost. It is sufficient here merely to cite examples.

Since July 1, 1918, the Forest Service has lost over 700 employees, or 28 per cent. of its total force, including 460 of its technical personnel. The Coast and Geodetic Survey in the same period lost 33 per cent. of its technical force. The Bureau of Standards lost 16.3 per cent. of its permanent staff in the District of Columbia in 1915-16, 27 per cent. in 1916-17, 48.6 per cent. in 1917-18, and 50.1 per cent. in 1918-19, a total of 840 resignations in four years out of an average force of 535. The separations from the combined technical staffs in Washington and Pittsburgh ag-

gregated 1,400 in the four years, out of an average personnel of 473, making an average annual turnover of 85 per cent. with a maximum in the fiscal year 1918-19 of 145 per cent.

These services require men of specialized training and years of experience in the work to be performed before they reach their full efficiency. It is self-evident that the technical work of the government can not be efficiently or economically performed under such circumstances. It would not be done even if the replacements were by individuals of equal ability, but it is not possible to maintain previous standards in such replacements. Individuals of equal ability will not accept the positions offered, and there must be in consequence a constant reduction of standards in order to fill the vacancies. Not only does the excessive turnover result in reduced amount of work for the same number of employees, and in reduced quality, but it also results in increased cost per unit of work performed. Studies made by the Coast and Geodetic Survey, in relation to its commissioned personnel, show that the aggregate cost during the fiscal year ending July 1, 1920, of using experienced men for training new employees, of lost time due to personnel changes, and of lessened efficiency due to inexperience is likely to be more than 25 per cent. in excess of the total annual payroll for such personnel.

The most serious aspect of the situation is in the fact that the demand from the outside is for the highest grade men, for the trained professional workers and for the best of the administrative officers—individuals difficult to replace in any circumstances, and particularly difficult to replace under present conditions. Many of the most efficient and most valuable employees are leaving; the less efficient and less